the velocity with which the gases and the flame flow, and which also acts as a reserve force through their inertia.

In a number of types of furnaces this live force or velocity is utilized to direct and force the flame or hot gases from the top down upon the hearth of the furnace. It has been shown that the cold external air has a tendency to enter the furnace through the cracks or openings below the working doors; since this cold air settles upon the hearth it acts as a heavy liquid flowing within a chamber filled with a light liquid, the hot gases. However, the material to be heated (ingots, faggots, billets, bars, etc., in the furnaces for the reheating of small pieces of metal, the molten metal of the open-hearth furnace, etc.) is always placed upon- the

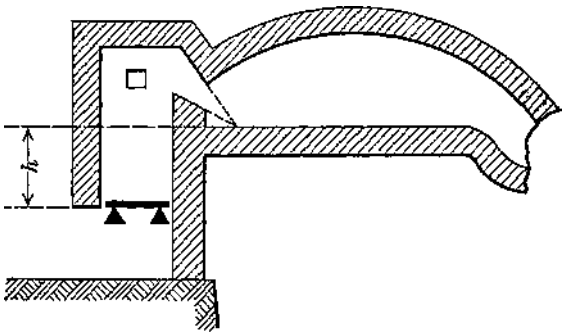

FIG. 16.

hearth. Therefore it is necessary to overcome the formation of such a current of cold air. There are two means of doing this:

1. Increasing the velocity of the flame by increasing the height *h.*
2. Bending the flame sharply down upon the hearth as it issues from the firebox, and in this way pushing back the cold air and preventing it from entering the furnace through the openings below the doors.

A furnace constructed to employ this second method is shown in Fig. 16. The increasing of the head *h* provides a possibility of increasing the thickness of the bed of fuel and of obtaining in the firebox a producer gas at a slightly lower

temperature. This increase in the head of the column of gases also permits the mixing of the producer gas from the firebox with a supply of preheated secondary air, supplied through channels in the bridge wall.